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geographical terms; a bibliography of geographical literature; in assembling a library of photographs, particularly of regions where geographical changes are most active, and in yet other directions.

Beyond the immediate and individual interests of a geographical society, or, what is more strictly true, perhaps, in most instances, the personal ambitions of a few of the members of such a society, is the broader and nobler aim of increasing man's knowledge of his dwelling place, and of widely diffusing such knowledge. In order to cultivate this larger field, the local society may reasonably be asked to relinquish, if necessary, some of its local prerogatives and look for compensation in the general advance that would be facilitated thereby. Among such restrictions the fact is to be recognized that should a society cease to publish directly, its returns from an exchange of publications with other societies would cease. Compensation for such losses might perhaps be looked for in a decrease of expenses for editing and printing, and might be made good by placing all the 'exchanges' received in return for the proposed magazine in the custody of some one society and thus striving to maintain one complete geographical library, which could be consulted directly, or its books, maps, etc., loaned to individual students.

In proposing the application of modern business methods in the concentration of geographical factories, as our societies may be termed, I wish to direct attention to the fact that geography more than any other science is best adapted for the purpose of general or popular education. Added to the fascinations of exploration we now have the equally absorbing results of scientific physical geography, pertaining to the fields through which we walk, the brook whose murmurs have appealed to us since childhood, the waves that beat on the shore

where we perhaps spend our vacations, and many other equally familiar scenes. The ability to read the history of the earth at first hand should be within the reach of every civilized man, woman and child. It is in order to secure to all the people in North America this means of public education, coupled with never ending pleasure and a constantly expanding mental horizon, that our geographical societies are asked to unite their efforts.

ISRAEL C. RUSSELL.

UNIVERSITY OF MICHIGAN.

SECTION E—GEOLOGY AND GEOGRAPHY.

GEOLOGY and geography together occupied a large share of the attention of the members of the American Association for the Advancement of Science at the third Philadelphia meeting of the association, which was held at the University of Pennsylvania, December 28–31, 1904. Section E, 'Geology and Geography,' of the association held its regular meeting on December 28, the principal feature of which was the address of the retiring vice-president, Professor Israel C. Russell, of Michigan University, on 'Cooperation among the American Geographical Societies. The following delegates were appointed to represent the societies named, in the consideration of Vice-President Russell's address: for the American Geographical Society, Cyrus C. Adams, of New York; for the Chicago Geographical Society, Professor J. P. Goode, of Chicago; for the American Climatological Association, Dr. W. F. R. Phillips, of Washington, and Dr. J. C. Wilson, of Philadelphia; for the American Alpine Club, Professor Angelo Heilprin, of Philadelphia; for the Harvard Travelers' Club, Professor W. M. Davis, of Cambridge; for Mazamas, Dr. T. Brook White, of Washington; for the Pelé Club, Professor Robert T. Hill, of New York.

The general program was introduced by

Professor A. P. Brigham, of Colgate University, with a paper on 'Early Interpretations of the Physiography of New York State,' in which were recounted some of the views expressed concerning physical features of the empire state in the early decades of the nineteenth century, and the years preceding. Among the travelers who placed themselves on record was Timothy Dwight, president of Yale College. He and others discussed the origin and retreat of Niagara Falls in ways that forcibly suggest views held to-day. In observing the waters of the Great Lakes and their connecting streams, the tendency toward grade and the base-level was recognized, though not of course in the terms or with the full consequences of modern doctrines. The gorge of the highlands, the deposits in the Hudson valley, and the features of Little Falls, received much notice, and the older writers were quite familiar with the extension of Lake Ontario which we now call Lake Iroquois. On the whole the prophecies of modern views are numerous and full of interest.

In a paper on 'The Menace to the Entrance of New York Harbor,' Professor Lewis M. Haupt discussed the projects which have been and are now being carried on by the general government for improving the channels of the Lower Bay. Up to 1886, the ruling depth on the bar was 23.3 feet at mean low water, which permitted the passage at high water of a vessel drawing 27 feet. At the meeting of the American Association at Buffalo in the summer of that year (1886), Professor Haupt read a paper on the method of improving this entrance by natural forces, but the government concluded, notwithstanding the unanimous report of one of its boards of engineers, to resort to dredging to create a 30-foot channel, 1,000 feet wide, which has been secured and maintained after the removal, up to October, 1891, of 4,875,079

cubic yards at a cost to date of \$1,967,111.82. These depths not meeting the requirements of the port, facilities are now being increased by the opening of the Ambrose channel, seven miles in length, crossing the central part of the bar, by dredging therefrom 42,500,000 cubic yards, provided it shall not cost more than \$4,000,000, or less than ten cents per yard.

By means of charts covering a period of 125 years, it was shown that the inlet to Jamaica Bay has moved westwardly seven miles in that time and that the deposits which were formerly arrested in that bay have now drifted past and are rapidly approaching the outer scarp of the New York bar. This one bank of sand contains some 65,000,000 cubic yards, while, on the other flank, the spit at Sandy Hook has advanced about a mile and is now moving into the bay, where it deposits a half million yards on the point every year, to say nothing of the sand held in suspension and which has been removed by dredging. The great quantities of drift thus advancing steadily into the entrance are becoming a serious menace to the harbor.

The remedy which Professor Haupt proposes consists of a single reaction training wall extending along the southerly side of the Ambrose channel to concentrate the ebb currents and the arresting of the littoral drift which will so soon convert Coney Island and Manhattan Beach into interior lagoons. The cost of this work would be less than one half of the present contract which guarantees no channel, as it is filling up even where dredged far below the requisite depths.

Dr. J. W. Spencer, of Washington, D. C., submitted a communication on 'The Submarine Great Cañon of the Hudson River,' in which he collated the results of soundings which have been made during a period of more than a century, but especially those of the last forty years. Professor

J. D. Dana first recognized the submarine channel of the Hudson as evidence of late continental elevation. Lindenkohl first perceived the cañon-like character of the outer portion of the channel near the border of the continental shelf, where the channel suddenly becomes a gorge 2,400 feet deep in the submerged plain. Lindenkohl thought that the cañon was terminated by a bar, but Dr. Spencer has determined that no bar exists and that the cañon cuts through the edge of the continental bench about eight miles farther. It then widens to a valley which can be readily recognized for an additional twelve miles and to a depth of 9,000 feet at a distance of 71 miles from the head of the submarine channel near Sandy Hook. The cañon is double, the upper part being four miles wide while the inner, lower, more sinuous portion is less than two miles across. The period of great elevation, amounting to about 9,000 feet, coincides with that of the early pleistocene. Since that time there has been a subsidence to somewhat below the present level, followed by a re-elevation of 250 feet as seen by the shallow channels of the continental shelf. The region is now sinking at the rate of two feet a century and is undergoing other and less important changes.

In a second paper on 'The Improbability of Land in the Vicinity of the North Pole,' Dr. Spencer said in part:

When Dr. Nansen discovered the deep Polar Basin, sharply defined by a continental shelf, 300-350 miles wide, north of Siberia, with this continuing to Spitzbergen, situated in its very edge, it was proof that no land was to be expected rising out of the basin until the continental shelf on the American side should be reached. The broad Siberian shelf continues even north of Bering Straits, and there are soundings which suggest the location of its approximate border. Alaska encroaches upon this shelf apparently to

near its border, thus reducing its breadth to probably 50 miles. Beyond into Beaufort Sea, the Mackenzie River empties by a fjord known to a depth of more than 1,140 feet and another from behind Bank's Land of 1,836 feet, not far from its own head far within the line of the islands. Among the islands another of the discovered fjords reaches to more than 2,400 feet. All of these features prove that the archipelago of high mountains is only a dissected plateau, now sunken and with drowned valleys between the islands, which valleys incise the continental shelf in such manner as to indicate that the shelf itself can not extend far beyond the outer line of the known islands. A sounding about 30 miles north of Grinnell Land, with a depth of 432 feet further suggests that the edge of the shelf is being approached, for the outer margin of this seems to be limited by a depth of about 300 feet beneath sea level. From these submarine topographic features, which are the very best guide, the author supposes that no important islands exist beyond the line of the known archipelago, and that the deep polar basin reaches for 300 or 350 miles from the pole, approaching the American continental shelf north of Grinnell Land.

The formal sessions of Section E closed with the reading of the following papers by title in the absence of their authors: 'The Structure of the Central Great Plains,' by N. H. Darton; 'Typical Desert Deposits of Eastern Persia,' by E. Huntington; 'Interpretation of certain Laminated Glacial Clays, with Chronologic Deductions,' by C. P. Berkey; 'The Fossiliferous Beds of Sankaty Head, Nantucket, and Their Age,' by Myron L. Fuller; 'On the Jagersfontein Tiffany (Excelsior) Diamond, Weight 971 $\frac{3}{4}$ Carats,' by George F. Kunz; 'On Some Pegmatyte Veins of California,' by T. C. Hopkins; 'The Petrography of Belvidere Mountain, Vermont,'

by V. F. Marsters, and 'Evolution of some Devonian Spirifers,' by A. W. Grabau.

The sessions of the succeeding days of the general convention were given over to the Geological Society of America. The vice-president and chairman for section E for the next annual meeting of the association is Professor William North Rice, of Wesleyan University, Middletown, Conn. The secretary of the Philadelphia meeting holds over, by constitution.

EDMUND OTIS HOVEY,
Secretary.

SECTION G—BOTANY.

DURING the recent meeting of this section at Philadelphia, the following items of business of public interest were transacted.

Professor C. R. Barnes, University of Chicago, Professor F. C. Newcombe, University of Michigan, Dr. D. T. MacDougal, New York Botanical Garden, Professor H. M. Richards, Barnard College, and Dr. Burton E. Livingston, University of Chicago, were appointed a committee to confer with a like committee from the Society of Official Agricultural Chemists on the meaning of the expression 'Plant Food.'

The council of the association appointed as delegates to the International Botanical Congress, to be held at Vienna during the coming summer, Professor C. R. Barnes, University of Chicago, Mr. C. L. Shear, U. S. Department of Agriculture, and Dr. H. C. Cowles, University of Chicago.

Dr. Erwin F. Smith, U. S. Department of Agriculture, was elected vice-president and chairman of this section for 1905.

A joint session was held with the Mycological Society on Friday afternoon.

The following are the abstracts of papers offered:

Stages in the Development of Sium cicutæ-folium. GEORGE HARRISON SHULL.

There is great range of variation in the

leaves of *Sium cicutæ-folium*, the first nepionic leaf being the most variable and the bracts in the region of the umbel least variable. The juvenile leaves and the senescent leaves, which have been interpreted as atavistic, are shown to disagree with each other in almost every particular. The only cases in which the ancestry of a species is definitely known indicate that whatever change of structure gives rise to new adult characters also results in changed juvenile and senescent characters. The relative simplicity of the juvenile and senescent leaves is due to physiological causes having no essential bearing on the phylogeny of the species. *Sium* is mesophytic, hydrophytic and xerophytic at different periods of its development and these structural differences are associated with, but appear to be independent of, their appropriate environmental conditions. They are not a direct effect of the environment, but are due to the peculiar mechanism of the protoplasm. Rejuvenescence is the process by which protoplasm is changed from the senescent to the juvenile condition. This may result through sexual reproduction or may be brought about in other ways. In *Sium* it occurs regularly in the lateral buds at the base of the stems and may, under special conditions, occur in any other vegetative bud or even in the flower buds. In passing from less complex to more complex leaves the new characters consist in incisions or indentations above the base of the leaf, so that, in pinnate leaves, the proximal pairs of leaflets are homologous, and other pairs which are of like order counted from the proximal pair are likewise homologous.

Alternation of Generations in Animals, from the View-point of a Botanist.
CHARLES J. CHAMBERLIN.

This is an attempt to show that the egg with its three polar bodies, and also the primary spermatocyte with the four spores